

Description

Field of the invention

5 Telecommunication networks today are usually administrated centrally. If a new network element is added then it must be ensured that it "gets along" with the already existing network elements, that is to say has the correct interface to the network and the correct drivers.

10 One step in the development of telecommunication networks is therefore the further development of "Plug & Play" in the form of "ad-hoc" networks. By way of example, a description of this novel network type, which will certainly gain significance in future, can be found in the article "Geistreiche Verbindungen, Intelligente Geräte in dezentralen Netzen" [Ingenious connections, intelligent appliances in distributed networks]. At present, various companies are involved in producing these mechanisms, as HP (with the product jetSend), Lucent (inferno) and also Microsoft (UPnP, Universal Plug 'n' Play, for example see <http://www.upnp.org>) in this regard) are developing similar systems.

20 The exemplary embodiments below describe the Jini™ mechanisms from the Sun company. This is not intended to be a limitation for the mechanisms according to the invention, however.

30 **Prior art**

The architecture and mechanisms of Jini™ are described in the Technical White Paper "Jini™ Architectural Overview" from Sun Microsystems. Ad-hoc networks, such as that of Jini™, are distinguished in that network elements, and hence also the services provided thereby, can be added to a network and removed again therefrom arbitrarily. In this case, services are understood

generally to mean an entity which can be used by a person, a program or another service. They may be hardware, software, filters, a communication channel, memory space and much more. Many individual services
5 may be necessary in order to perform an order.

The central control is undertaken by "blackboards". Network elements can notify the blackboard of their existence and of their capabilities (join) and can look for services which are able to provide capabilities
10 (lookup, discovery). A leasing mechanism is provided for use of the services, and this involves the entities concerned agreeing a period of use, after the expiry of which the resources of the service used are released again.

15 The communication between services can be effected using Java Remote Method Invocation (RMI™).

The methods described by Jini™ currently work within a local area ad-hoc telecommunication network.

20 It is an object of the invention to improve the methods for the use and provision of services in ad-hoc telecommunication networks and hence to achieve qualitative extension of the available functionality.

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Presentation of the invention

This object is achieved by a method according to Patent Claim 1.

30 The access to services is extended, from the local area ad-hoc network, and the accessible services, to other hierarchically adjacent, superordinate or subordinate networks and hence the accessible services thereof.

35 The attendant advantages become clear in the scenarios described further below.

Advantageous refinements and developments are specified in the subclaims.

In a first embodiment, services from ad-hoc networks which exist beside one another are rendered mutually accessible. It is possible for the services in question to be configured (in line with the previously known
5 "optional configuration"), which may involve an indication of whether a service can be used only locally or whether it is released for use from other networks.

In a second embodiment, ad-hoc networks are formed in a
10 hierarchically staggered arrangement. In order to look for a suitable service, a search is then first of all performed in the user's "own network" (locally), then in the hierarchically superordinate network, and so on. Filter mechanisms and concealment of "layers" are
15 likewise conceivable in this case, like the support for a special selection criteria.

The two solutions described previously are independent of the transport layer, which makes provision for connection of the ad-hoc network at transport layer
20 level (in the case of Jini™ or UPnP at IP level).

In addition, solutions at transport layer level, for example through a secure transport client or through the ad-hoc middleware level (for example through a security layer in the Middleware), are possible, as
25 well as the combination of both.

Brief description of the drawings

The invention is explained below with reference to
30 exemplary embodiments. In the drawings,

Figure 1 shows a schematic design for an exemplary network in which the local extension is used,
Figure 2 shows a schematic design for an exemplary
35 network in which remote access is applied to local area ad-hoc networks,

Figure 3 shows a schematic design for an exemplary network in which the global extension is applied, and

Figure 4 shows a schematic design for an ad-hoc network with example services registered therein.

Description of the preferred embodiments

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Jini™ controls the management of resources of remotely used services via blackboards.

Figure 4 shows an exemplary scenario for an ad-hoc network in order to illustrate the principles of ad-hoc networks and the services provided thereby. By way of example, a service user (user) wishes to use a service Photo Service. Said service is logged on a lookup service and can be sought by the service browser of the service user. The services shown are of quite different nature, for example there are

- a photo service,
- a print service,
- 20 - a phonebook service,
- a scan service,
- mobile radio services (such as SMS),
- and many more.

25 These services are provided by terminals of different nature:

- fax machine,
- printer,
- 30 - scanner,
- digital camera,
- mobile phone,
- computer, laptop, handheld appliance, organizer...
- and many more.

35

These terminals may in turn be situated in different networks:

- mobile radio network,

- conventional telephone network PSTN,
- in this case a wireless IP network, for example implemented on the basis of Siemens I-Gate IEEE 802.11 WLAN 2 Mbit peer to peer.

5

By way of example a customer now wishes to take a photograph and to print it on the printer which is closest to him. This requires him to use different services. The photograph produced is stored as a file.

10 So as now to print it, the file needs to be transferred to a printer (Print Service). However, there may be no suitable printer available in the vicinity, but instead there may be a fax machine (FaxPrintScanService).

The individual services are accessed via a blackboard
15 (not shown in the figure). These services can be provided as Jini services. For this purpose, Jini™ additionally provides a transport system of user interfaces (interfaces).

20 Figure 1 now shows a first advantageous embodiment of the method according to the invention. There are two parallel ad-hoc networks Local and Neighbour, for example wireless, one in the user's own apartment and one in the neighbouring apartment (or office floors, departments ...). The intention is now for the
25 neighbour to be allowed to access extraneous services, represented by a solid arrow. In this case, it is advantageous if access to particular services can be permitted ("locally extendable", Service 1) and access
30 to others can be restricted ("locally restricted", Service 2), represented by the dashed arrow. This classification is supported by the Middleware of the ad-hoc network. In addition, the Middleware now renders only the "locally extendable" services transparent and
35 accessible to the ad-hoc network of the neighbouring apartment. This presupposes appropriate authentication and authorization mechanisms in the Middleware. Regardless of this, the transport layer is seen. In the case of the wireless networks described above in

neighbouring apartments, the connection described may already have existed to date (and can be terminated again at an undefinable time, for example because the ad-hoc network has been broken up).

5 In this case, the solution is intended not to require administration so that the advantageous Plug & Play mechanism is not violated. However, it is possible for all terminals to be associated with a particular ad-hoc network, for example by virtue of their being allocated
10 a card, a chip or a name.

Figure 2 shows a hierarchy for ad-hoc networks in which, on the basis of the onion principle, inner networks (Local) are nested in outer networks (global). The
15 desired service is always first sought in the user's own network, then in the adjacent network (Neighbour), and then one layer after the other further outwards. Depending on the application, concealment of the layers or a layer or an ad-hoc network as selection criterion
20 can be supported.

In this case too, the technical solution is independent of the transport layer, which, depending on the network, may comprise quite different, e.g. wired and wireless, media.

25 Finally, in contrast to Figure 1 and Figure 2, Figure 3 shows the remote access to local area ad-hoc networks via a transport client C and a Jini gateway J at transport layer level. The access can also be effected
30 via a security layer in the Middleware level of the Jini gateway.

Bibliography

5 "Geistreiche Verbindungen, Intelligente Geräte in
dezentralen Netzen" [Ingenious connections, intelligent
appliances in distributed networks], Claudia Piemont,
c't 20/1998, page 198-202.

"JINI™ Architectural Overview", Technical White Paper,
SUN Microsystems, January 1999

(for example available at <http://www.sun.com/jini/>)

Patent Claims

1. Method for the use and provision of services in a first ad-hoc telecommunication network (Local), which is self-configuring and comprises a multiplicity of network elements and services (Service 1, Service 2) which exist in distributed form in said telecommunication network and which are able to log into said network and to log out of it again by virtue of mechanisms provided specifically for this purpose, for a second ad-hoc telecommunication network (Neighbour), which is independent of the first network.

2. Method according to Patent Claim 1, characterized in that the services of the first ad-hoc telecommunication network (Local) can be classified, which involves stipulation of which of said services (Service 2) are available only locally in the first ad-hoc telecommunication network and which services (Service 1) can also be accessed from a second network (Neighbour).

3. Method according to Patent Claim 2, characterized in that the services of the first ad-hoc telecommunication network (Local) can be classified, which involves stipulation of which services (Service 1) can be accessed from which second networks (Neighbour).

4. Method according to Patent Claims 1 to 3, characterized in that a required service (Service 2) is sought on the basis of a stipulated strategy.

5. Method according to Patent Claim 4, characterized in that the sought service (Service 2) is sought:

- in the user's own ad-hoc telecommunication network (Local),
- in the adjacent telecommunication networks (Neighbour),
- 5 - in the next superordinate telecommunication network (Global).

6. Method according to one of the preceding patent claims,

10 characterized in that

the service (Service 1) in the first ad-hoc telecommunication network (Local) is accessed via a second telecommunication network (Internet), which is different from the ad-hoc network, and a gateway (J).

Method for the provision of services in a telecommunication network

It is an object of the invention to improve the methods for the use and provision of services in ad-hoc telecommunication networks and hence to achieve qualitative extension of the available functionality.

FIG 1

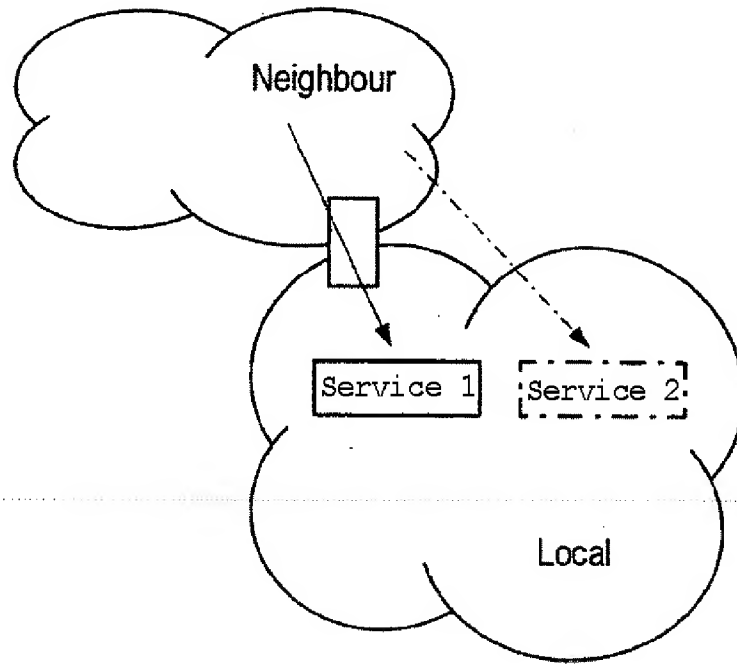


FIG 3

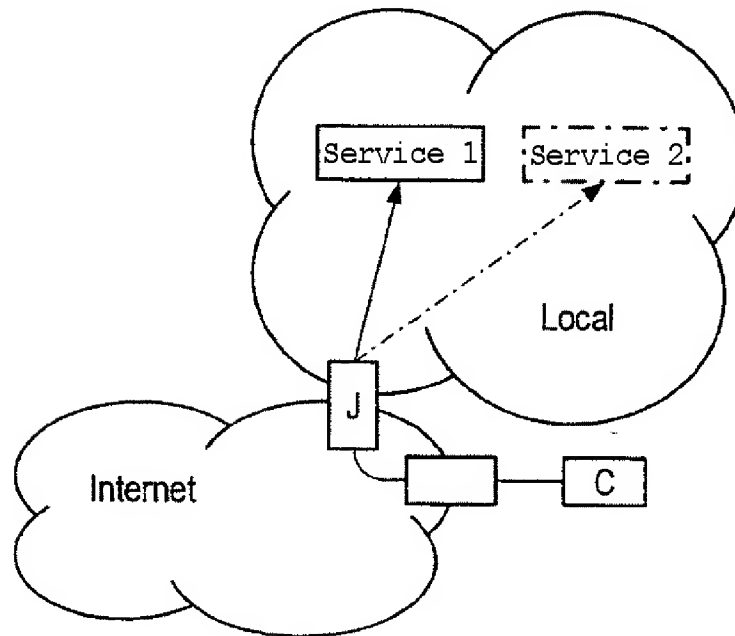


FIG 2

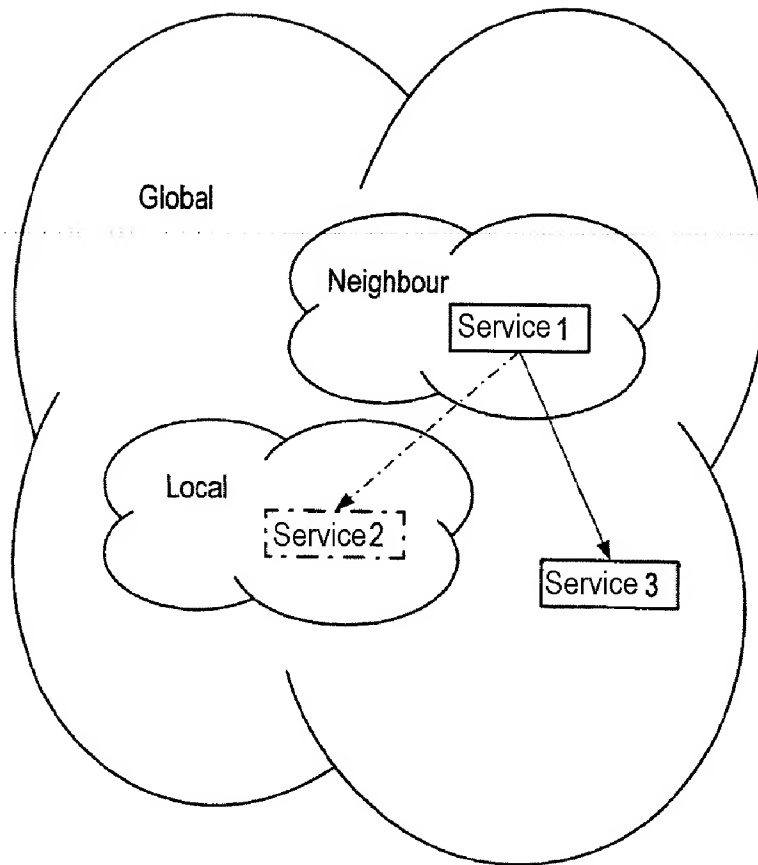


FIG 4
Prior art

